

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Ulrich Brochheuser, et al.

Serial No.: 10/562,349

Group Art Unit: 3725

Filed: May 4, 2006

Examiner: Debra M. Wolfe

For: BACKWARD EXTRUSION PROCESS FOR INNER PROFILES

Attorney Docket No.: GKNG 1264 PCT

Board of Patent Appeals and Interferences
United States Patent and Trademark Office
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APPEAL BRIEF

This brief is submitted pursuant to the Notice of Appeal of the Final Rejection filed February 25, 2008 and pursuant to the Notice of Panel Decision from Pre-Appeal Brief Review mailed March 26, 2008.

(I) REAL PART IN INTEREST

The real party in interest in this matter is GKN Driveline Deutschland GbmH, and is the assignee of the present invention and application.

(II) RELATED APPEALS AND INTERFERENCES

There are no other known appeals or interferences, which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(III) STATUS OF THE CLAIMS

Claims 1 and 6-15 are currently pending and were under final rejection, from which this appeal is taken. The Examiner has noted that Claims 7, 9 and 11 are presently allowable after a post final amendment. Claims 1, 8, 10 and 12-15 stand rejected

Claims 2-6 have been cancelled.

(IV) STATUS OF AMENDMENTS

There were amendments after final amending claim 1 and cancelling claims 2-6. The Examiner has indicated that these amendments will be entered and claims 7,9 and 11 are presently allowable. Claims 1, 8, 10 and 12-15 stand rejected.

(V) SUMMARY OF CLAIMED SUBJECT MATTER

Referring initially to Figures 1-6 and pages 5 and 6, the invention is directed to process of producing an inner profile 18 in a tube or hollow profile 11 p.4. Independent Claim 1 described the process: The process provides a tube or hollow profile 11 having an internal through opening and a constant cross section over the length thereof [Figure 1]. The tube or hollow profile is inserted into a supporting sleeve 12 with a first tube end 19 being axially supported [Figure 2] (specification page 4). A pressure loaded annular die 16 is placed on a second tube end 20

[Figure 3] (specification page 4). A forming die 15 having an outer profile is pressed into the tube or hollow profile 11 from the second tube end 20 to produce an inner profile 18 [Figure 4] (specification page 4). The annular die 16 is returned under a pressure load in the opposite direction of that of the pressing die 15 [Figure 5] (specification page 4). Finally the pressure load on the annular die 16 is reduced with an increasing return path (Specification page 7).

Unlike prior processes, the present invention allows a counter pressure to be built up on the back flowing, completed tube or hollow profile with an inner profile, which counter pressure forces the material to flow into the full profile cross-section of the forming die and prevents under-filling at the start of the inner profile (specification page 4).

(VI) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following issues are presented in this appeal, which correspond directly to the Examiner's final ground for rejection in the final Office Action dated October 24, 2007:

A. Whether claims 1 and 13-15 are patentable under 35 U.S.C. §103(a) over Applicant's admitted prior art in view of U.S. PGPub 2002/0092168 to Ilhara. (hereinafter, Ilhara).

B. Whether claims 8 and 9 are patentable under 35 USC 103(a) over Applicant's admitted prior art in view of Ilhara in further view of Budrean et al (US 4,785,648).

(VII) ARGUMENT

As the Examiner has acknowledged the allowability of claims 7,9 and 11, the Applicant will direct argument to the remaining claims for which there is a single independent claim (Claim

1)

35 U.S.C. §103(a) Admitted Prior art in view of Ilhara**Claim 1**

Claim 1 was rejected under 35 USC 103(a) by the Applicant's admitted prior art in view of Ilhara. The Applicant respectfully requests the Board to overturn this rejection. The Examiner asserts that it would be obvious to one of ordinary skill in the art to reduce the pressure load acting on the annular die with an increasing return path (pressure acting upon the annular die (43) by the second end (Wba)) in order for the inner profile to be formed by the backward extrusion process.

The Applicant traverses this rejection and seeks the Board's reconsideration in light of the following arguments:

The claimed process of producing an inner profile in a tube or hollow profile is characterized by the following features:

- providing one of a tube or hollow profile having an internal through opening and a constant cross section over the length thereof;
- inserting the tube or hollow profile into a supporting sleeve, with a first tube end being axially supported
- placing a pressure-loaded annular die on to a second tube end;
- pressing a firming die with an outer profile into the tube or hollow profile from the second tube end for producing the inner profile;
- allowing a return of the annular die under a pressure load in the opposite direction of that of pressing in the forming die;
- wherein the pressure load on the annular die is reduced when an increasing return path (see Claim 1)

The claimed process has the advantage that a counter-pressure can be built up on the back flowing portion of the tube, thereby forcing the material to flow into the full profile cross-section of the forming die (specification page 4). Thus, an under-filling of the inner profile is prevented so that, as a result, the produced tube or hollow profile has an improved surface quality. For building up the counter-pressure, it is thus crucial according to the invention to provide an annular die which exerts a load to the second tube end during the forming process.

According to the admitted prior art process, the tube or hollow profile is deformed by pressing in a forming die whose outer profile corresponds to the inner profile to be produced (specification page 3). The material displaced as a result of the production of the profile leads to a backward extrusion of the deformed tube. When carrying out this prior art process, there exist limits regarding the profile height, namely the difference between the smallest cross-section and the greatest cross-section of the forming die. With an increasing degree of deformation, the profile filling becomes inadequate and the material does not fully fill the tool contour of the forming die, which results in an unusable product.

Thus, the claimed process of producing an inner profile in a tube or hollow profile differs from the own admitted prior art at least by the following features:

- placing a pressure-loaded annular die onto the second tube end;
- allowing a return of the annular die under a pressure-load in the opposite direction of that of the pressing in the forming die; and
- the pressure-load on the annular die is reduced with an increasing return path. (Claim 1, Specification page 8)

By means of the annular die which is pressure-loaded to the second tube end, the object of the present invention is solved, namely to propose a process of producing inner profiles, which ensures an improvement in the degree of filling of the mold and which make bigger profile heights safe for production. The counter pressure which is built up by the annular profile forces the material to flow into the full profile cross-section of the forming die and thus prevents an under-filling during the forming process.

Comparing Ilhara (US 2002/0092168 A1) disclosures in Figure 4b and the corresponding description, a cup forming process. The Applicant disagrees with the Examiner's interpretation and asserts that Ilhara clearly fails to show an annular die being pressure-loaded against the tube end, wherein the annular die is returned under a pressure-load in the opposite direction of the forming die (in other words: the annular die exerts a pressure-load onto the tube end while being moved away from the tube), and wherein said pressure-load on the annular die is reduced with an increasing return path. The Applicant respectfully requests the Board's reconsideration.

Ilhara teaches the opposite, namely that there is provided a stripper 43 which is simply a carrier member into which the punch 42 is fitted so that the punch 42 can be moved up

and down relative to the stripper 43. It is clearly said on page 5, paragraph [0052] of the Ilhara citation that the tapered peripheral wall face Wba will be not constrained by the annular free end face of the tubular body 43a. In other words, the stripper 43 exerts no load onto the work piece.

From this it follows that also a combination of the admitted prior art in view of Ilhara fails to disclose the essential features of the claimed process, namely placing a pressure-loaded annular die onto the second tube end and allowing the return of the annular die under a pressure load, wherein the pressure-load on the annular die is reduced with an increasing return path. Therefore, the claimed process should be regarded to be based on an inventive step over the cited prior art. These limitations are not taught or suggested by the cited art either alone or in combination. The Applicant respectfully requests the Board's reconsideration.

Claims 13,15

The Applicant respectfully allows these claims to rise or fall based upon the allowability of the underlying base claim.

Claim 14

Claim 14 recites the claimed limitation wherein the annular die 16 retracts during the step of pressing in response to a backward flow of material (specification pages 7-8) Neither the admitted prior art nor Ilhara teaches this limitation. As such, claim 14 should not have been rejected for at least the same reasons as claim 1, and it is respectfully requested that this Board reverse this rejection.

Claim 12

Claim 12 was not addressed by the Examiner. Claim 12 recites the claimed limitation wherein the second tube end 20 is only radially supported by the sleeve. Ilhara clearly provides some support other than radial through the use of the stripper 43. As such, claim 12 should not

have been rejected for at least the same reasons as claim 1, and it is respectfully requested that the Board reverse this rejection.

35 U.S.C. §103(a) Admitted Prior art in view of Ilhara in further view of Budrean

Claims 8, 10 and 11 were rejected under 35 USC 103(a) by way of Admitted Prior art in view of Ilhara in further view of Budrean.

Claims 8-11

The Applicant respectfully traverses this rejection and seeks the Board's reconsideration. The Applicant incorporates the aforementioned arguments with regard to the insufficiency of the admitted prior art and Ilhara to teach all the underlying limitations of the claimed invention. The addition of the Budrean reference fails to repair the insufficiency of the prior rejection. The Budrean reference clearly fails to disclose the claimed features above relating to the pressure loaded annular die. Since none of the cited references, either alone or in combination teach all of the claimed limitations, reconsideration is formally requested.

The Applicant further traverses the Examiner's assertion that it would be inherent to one of ordinary skill in the art that the pressure load acting on the annular die must be reduced with an increasing return path (p3, par 2 of the office action). The Applicant traverses this assertion and notes that one skilled in the art would not find even a hint in the cited or stated prior art that would suggest this use of a pressure-loaded annular die such as claimed by the present invention. The Examiner provided no support for the statement that reducing the pressure load with an increased return path would be obvious. The Applicant respectfully requests the Board's reconsideration and asserts that the claims are presently in condition for allowance. The Applicant notes that claims 8, 10 and 11 may be allowed to rise and fall with the patentability of independent claim 1.

It is respectfully asserted that the claims as currently pending are in condition for allowance and that a Formal Notice of Allowance be issued therefor.

(VIII) CLAIMS APPENDIX

See Exhibit A.

(IX) EVIDENCE APPENDIX

None

(X) RELATED PROCEEDINGS APPENDIX

None

(XI) CITED REFERENCES APPENDIX

Ilhara (U.S. Publication No. 2002/0092168)

Budrean (U.S. Patent No. 4,785,648)

(XII) CONCLUSION

For the reasons advanced above, Appellants respectfully contend that each claim is patentable. Therefore reversal of the rejections of the pending claims, and Notice of Allowance thereof are requested.

Respectfully submitted,



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EVIDENCE APPENDIX

No submitted or related evidence.

RELATED PROCEEDINGS APPENDIX

No related proceedings

CITED REFERENCES APPENDIX

Ilhara (U.S. Publication No. 2002/0092168)

Budrean (U.S. Patent No. 4,785,648)

EXHIBIT A

EXHIBIT A**CLAIMS APPENDIX**

1. A process of producing an inner profile in a tube or hollow profile comprising:

providing one of a tube or hollow profile having an internal through opening and a constant cross section over the length thereof,

inserting the tube or hollow profile into a supporting sleeve, with a first tube end being axially supported;

placing a pressure-loaded annular die on to a second tube end;

pressing a forming die with an outer profile into the tube or hollow profile from the second tube end for producing the inner profile; and

allowing a return of the annular die under a pressure load in the opposite direction of that of pressing in the forming die;

wherein the pressure load on the annular die is reduced with an increasing return path.

2-5. (Cancelled)

6. (Cancelled)

7. A process of producing an inner profile in a tube or hollow profile comprising:

inserting the tube or hollow profile into a supporting sleeve, with a first tube end being axially supported;

placing a pressure-loaded annular die on to a second tube end;

pressing a forming die with an outer profile into

the tube or hollow profile from the second tube end for producing the inner profile; and

allowing a return of the annular die under a pressure load in the opposite direction of that of pressing in the forming die,

wherein the pressure load on the annular die is reduced in such a way that the sum of an integrated wall friction between the tube or hollow profile and the supporting sleeve in the region of deformation, and the pressure load on the annular die remains approximately constant.

8. A process according to claim 1, wherein the inner profile is a splined shaft profile.

9. A process according to claim 7, wherein the inner profile is a splined shaft profile.

10. A process according to claim 1, wherein the inner profile is a ball track profile.

11. A process according to claim 7, wherein the inner profile is a ball track profile.

12. A process according to claim 1, wherein the second tube end is only radially supported by the sleeve.

13. A process according to claim 1, wherein the supporting sleeve is axially longer than the tube or hollow profile.

14. A process according to claim 1, wherein the annular die retracts during the step of pressing in response to a backward flow of material.

15. A process according to claim 1, wherein the annular die and pressing die are coaxially arranged.